

**GUJARAT TECHNOLOGICAL UNIVERSITY**

**CIVIL (CONSTRUCTION ENGINEERING AND MANAGEMENT) (14)**

OPERATION RESEARCH IN CONSTRUCTION PROJECTS

**SUBJECT CODE: 2731402**

M.E. 3<sup>rd</sup> SEMESTER

**Type of course:** Major elective

**Prerequisite:** Nil

**Rationale:** The course is design to provide fundamental knowledge of Operation Research Construction Projects.

**Teaching and Examination Scheme:**

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P		Theory Marks		Practical Marks				
			ESE (E)	PA (M)	ESE (V)	PA (I)				
						ESE	OEP	PA	RP	
4	2#	0	5	70	30	30	0	10	10	150

**Content:**

Sr. No.	Course Content	Total Hrs	% Weightage
1.	<b>Introduction</b> Introduction to Operation Research history, nature, scope and phases of Operation Research, Classification of Operation Research models.	04	10
2.	<b>Decision Theory</b> Decision strategies - decision under certainty - decision under risk - decision under uncertainty - formulation - decision criterion and decision under competitive situation.	12	25
3	<b>Game Theory</b> Classification of games. Two - person, zero - sum games - formulation of pay off matrix - saddle points -games with pure strategies and mixed strategies - value of the game. Solution to 2 x 2 matrix, 2 x n matrix, m x 2 matrix and m x n pay-off matrix. Graphical method, algebraic method, linear programming methods. Guidelines to modelling an OR project.	12	25
4	<b>Linear Programming</b> General and standard forms of LPP, Formulation and solution methods - graphical solution - simplex method – dual simplex method, dynamic L.P, Transport and assignment models, Post - optimality analysis, Complications in LP problems and resolution, Queuing theory and waiting time - application to industries, Introduction to dynamic programming and network analysis, Monte - Carlo system simulations.	12	25
5	<b>Case Studies</b> Developing mathematical models related to construction projects, Solution to problems using QSB computer package.	08	15

**Reference Books:**

1. Theory & Problem of Operations Research by Richard Bronson, Schaum's Outline Series – Mc Graw Hill Book Co., 1983
2. Operations Research : An Introduction by Hamdy A. Taha - Maxwell Macmillan International Edition - IV Edition - 1989
3. Operations Research for Management by G.V. Shenoy, U.K. Srivastav, S.C. Sharma - Wiley Eastern Limited - 1988
4. Operations Research for Management by M.P. Gupta, J.K. Sharma-National Publishing House - 2nd Edition - 1987
5. Operations Management by John O. McClain and Joseph Thomas - Prentice Hall of India Private Limited, New Delhi - 1987
6. Quantitative Methods and Operations Research by R.C. Gupta - CBS Management Series - 1986
7. Quantitative Techniques in Management by Vohra -Tata McGraw Hill Book
8. Co.
9. Rea's Problem Solver - Operation Research - Research & Education Association Publication

**Course Outcome:**

Students will able to apply decision theory, game theory, linear programming, queuing theory, simulation etc. for effective and efficient management of construction projects.

**List of Tutorials:**

1. Decision theory
2. Game theory
3. Formulation of LPP
4. Solution of LPP by graphical method, simplex method, big M method, 2<sup>nd</sup> phase method.
5. Sensitivity analysis.
6. Transportation problems.
7. Assignment problems.

8. Nonlinear & dynamic programming problems.
9. Waiting line theory
10. Use of QSB computer package

**Review Presentation (RP):** The concerned faculty member shall provide the list of peer reviewed Journals and Tier-I and Tier-II Conferences relating to the subject (or relating to the area of thesis for seminar) to the students in the beginning of the semester. The same list will be uploaded on GTU website during the first two weeks of the start of the semester. Every student or a group of students shall critically study 2 papers, integrate the details and make presentation in the last two weeks of the semester. The GTU marks entry portal will allow entry of marks only after uploading of the best 3 presentations. A unique id number will be generated only after uploading the presentations. Thereafter the entry of marks will be allowed. The best 3 presentations of each college will be uploaded on GTU website.